Best-practices in Instructional Graphic Design

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Abstract

This paper examines the best-practices in the fields of both graphic design and instructional design in an attempt to define instructional graphic design best-practices that incorporate the best standards in both fields. The importance of using contrast in size, shape, and color is key to getting learners' attention. Including content and graphic elements that matter to learners helps keep their attention.
Introduction

Instructional message designers can and should use graphics effectively in their course and document design because educational research has shown that learners learn better from words and pictures than from words alone (Mayer, 2001, as cited in Clark & Lyons, 2004). As a fiber artist and photographer for many years, I have garnered some skills in design and composition, but I fear my instructional graphics err on the side of being more aesthetically pleasing than effective. This paper examines best-practices in the fields of both graphic design and instructional design in an attempt to define instructional graphic design best-practices that incorporate the best standards in both fields.

Graphic Design

Graphic design is the process of communicating visually using text and images to present information (Wikipedia, 2008). Generally, there are several main components of “good” graphic design (George-Palilonis, 2006):

- **Balance**, which refers to designing for a comfortable sense of equilibrium. Asymmetry creates a sense of movement and helps to guide the eye; symmetry conveys stability and uniformity and is thus more conservative.

- **Harmony**, which means how well individual parts of a page work together, and are consistent, like typefaces, shapes, and lines.

- **Repetition (rhythm)**, which refers to the arrangement of elements that moves the viewers’ eyes across a graphic.

- **Contrast**, which helps define what is important, and can be used with text, color, shapes, textures, or spatial arrangements to attract attention.

- **Proximity**, which refers to objects being either close together if they “belong” together or far apart if they don’t.
Instructional Graphic Design

Instructional graphic design takes into account many of the best practices in graphic design but considers other factors as well. Instructional graphics are defined as “iconic expressions of content that are designed to optimize learning and performance in ways that improve the bottom-line performance of organizations” (Clark & Lyons, 2004). The process of creating instructional graphics consists of determining the qualities of the learner, defining the goals of instruction, and creating some visual approach to assist in the transition to knowledge.

Determining the qualities of the learners – knowing what, if any, prior knowledge learners have about the subject – is crucial because the activation of prior knowledge is an essential instructional event that must occur early in instruction (Clark & Lyons, 2004). If, for example, the designer believes that his or her learners lack prior knowledge, a high-level overview of the content would prove very helpful to those learners, and that is important for the designer to know at an early stage.

The goals of the instruction – to motivate, inform, or to build procedural or problem-solving skills - strongly influence the value of a graphic. “Certain kinds of visuals help learners see the relationships among information in a lesson and in turn help learners build mental models that are a basis for higher-level thinking and problem-solving.” (Clark & Lyons, 2004)

Experienced instructional graphic designers create visual aids using, among other tools, the graphic design best-practices of harmony, balance, repetition, contrast, and proximity, after first considering the goal of the instruction and the qualities / existing knowledge of their learners. Accordingly, there is a clear overlapping relationship between graphic design and instructional design (see Figure 1):
After the designer has identified the goals and context of the graphic, the visual approach is developed which combines the graphic design best practices with the intentional consideration of three inter-related components of message design: attention, perception, and organization.

Attention, Perception, and Organization

The instructional graphic designer strives to gain and hold the viewer’s attention, for without these occurring the message is lost before it has ever been conveyed. Attention is always subjective – we give our attention to what interests us and to what arouses our feelings and/or needs. “Visual perception is the meaning concluded after visual sensual stimuli are received” (Lester, 2000). Learners perceive before they learn, therefore instructional graphic designers need to understand how people perceive in order to grab and keep viewers’ attention. Learners put things they perceive into some kind of order, or at least they strive to. “In like ways, when we process visual language, we group and parse design elements, drawing on perceptual categories
held in memory to recognize them and comparing their immediate iterations to previous
encounters” (Kostelnick, 2003). The instructional graphic designer should ensure that the order
is actually the correct one, or else the learner may decide on groupings or relationships that in
fact are not the groupings or relationships the designer intended. The clear and complete
organization of an instructional graphic can help grab learners’ attention, can ensure that the
learner is not completing his or her own (incorrect) idea of relationships, and can help the
learner “chunk” the information into working memory.

Gaining and Keeping Learners’ Attention

Gaining attention

Graphic designs of all types incorporate contrast and other elements such as proximity,
repetition, and alignment, all of which help learners group objects in meaningful ways, that help
to get viewers’ attention. Of these, the most effective in instructional graphic design is clearly
contrast, in its many forms, such as size, shape, and color.

Williams and Tollett (2006) found:
Contrasting elements guide your eyes around the page, create a hierarchy of
information, and enable you to skim through the vast array of information pick out
what you need. The contrast might be a type that is bolder, bigger, or a very
different style; it might be different colors, graphics signposts, or spatial arrangement.
To be effective, contrast must be strong. On any design piece there must be a focal point.
Something must be the dominating force and the other elements follow a hierarchy
from that point down. This focus is created by contrast. When all the type is the same
size, there is no hierarchy of importance. If everything has the same priority, then
nothing has priority. But something should be the most important. Contrast helps
define what is important.” (p. 126)

“In visual messages, attention can be directed by the use of contrasting brightness, color,
size, shape, type style, and motion. This is why the use of some color in a black-and-white image,
bold type in a text, and animation of just one single object on a screen is so effective at drawing
attention” (Fleming & Levie, 1993).
Likewise, “if everything is big, nothing is big. Proportion can be achieved through size and shape, and can create sense of hierarchy in order. Proportion is also achieved by incorporating elements of varying sizes or shapes in a layout. This allows us to compare them to one another and make visual judgments about the relative sizes and shapes in proportion” (George-Palilonis, 2006). It’s also important “for image producers who want to make a memorable message to understand that brain cells are complex difference-detectors. They are stimulated more by the relative difference between visual elements than by the intensity of each element. Consequently, a gaudy, colorful presentation may lose much of its impact, if all its graphic elements have the same intensity. The differences between the colors, lines, and shapes detected by brain cells are only part of the reason that some messages are noticed and others are not” (Lester, 2000).

Shapes are powerful communicators as well, even when they are not used directly in a contrasting manner. German psychologist Max Wertheimer, who created the gestalt theory of visual perception, defines the law of similarity as: given a choice by the brain, you will select the simplest and most stable form to concentrate on. This law stresses the importance of basic shapes in the form of squares, circles, and triangles (Lester, 2000).

Further detailing the effects of shapes on viewers, anthropologist Evelyn Hatcher stated: **Straight lines** convey a message of stiffness and rigidity. Straight lines can be horizontal, vertical, or diagonal. **Horizontal lines**, especially when low in the frame, remind viewers of a horizon with plenty of room to grow. If the horizontal line is high in the frame, the viewer feels confined as the layout seems heavy. In a layout, vertical lines bring the eye of the viewer to a halt. The eye attempts travel around the space created by the line. **Diagonal lines** have a strong, stimulating effect in the field of view. The most restful diagonal line is one that extends from the top right to the lower left corner of the frame. It is a perfect compromise between horizontal and vertical forces. Any other diagonal line strongly moved the eye of the viewer in the lines direction. Several diagonal lines within a composition create a nervous dynamic energy. **Curved lines** convey a mood of playfulness, suppleness, and movement. Curves have a gracefulness about them that softens the content of their active message. If lines are thick and dark, their message is strong and confident. If thin and light with a clear separation between them, their mood is delicate, perhaps a bit timid. **Grouped lines** form blank spaces that the eyes naturally want to inspect. A shape that is quickly recognized is clearly separated from the background of the image. The three basic shapes or parallelograms, circles, and triangles. From these three shapes, variations that compose all known or
imagined forms can be created. As with all visual attributes, a particular culture assigns meaning to each shape.

A square shape, with its formally balanced, symmetrical orientation, is the most dull and conventional shape, but strength also comes from its plain appearance. A square is considered sturdy and straightforward. In language, the equivalents are a square deal or a square shooter. The implication from the phrases is that the business transaction or person so described may not be flamboyant, but that you can trust that person to be fair.

Rectangles are the slightly more sophisticated cousins of squares. Of all the geometric figures, rectangles are the most common and are the favored shape of the frame for mediated images. In a rectangular frame, the chief object of focus does not have to be in the center for the piece to appear balanced. White or blank space offsets the end object in a frame to create a unified composition. With a square format, an object close to one side of the frame creates an unbalanced appearance.

Circles have always been associated with the endless rhythmic patterns of time, symbolizing eternity without clear beginnings or endings. A graphic designer must use circles carefully. They immediately draw the viewer’s eye in their direction and thus can overpower an image’s main message.

Triangles are the most dynamic and active of shapes. As energetic objects they convey direction, but they can burden a design with the tension they create. The two types of triangles -- equilateral and isosceles -- have vastly different moods. All three sides of an equilateral triangle are the same length. It shaped in bases are renewed because of symmetrical balance. Think of the silent stone periods of Egypt. They calmly watch the passing of each millennium. The triangle juggles its two parts -- the base and the apex -- to create a dynamic energy. From its base comes stability, but from its peak comes tension. In contrast, the isosceles triangle draws its power not from its base, but from its sharp point. Pointed in any direction, isosceles triangles challenged the eye to follow. When using the isosceles shape, a visual communicator, must be sure to give the viewer a message to see at the end of its points’ (Lester, 2000).

Color is of value when it emphasizes relevant cues, is used as a coding device, or when it is part of the content to be learned (Clark and Lyons, 2004). Warm colors (red, orange) come forward and command our attention, while cool colors (blue, green) recede. See Figure 2 for a comparison of using red and light blue as text color in a graphic (Williams, 2004).
Clearly, designers can incorporate varieties of contrast and shapes to draw learners’ attention to the instructional message; but the attention needs to be maintained in order for the message to be learned.

**Keeping learners’ attention**

Once the graphic has gotten the learners’ attention, it’s important that the attention stays focused so that learning happens. The instructional graphic designer can help learners stay
focused by activating prior knowledge and using other approaches that will help give structure to the new content.

Clark and Lyons (2004) stated:
The well-known learning psychologist Robert Gagne proposed several key events of learning. Event number three is *activating prior knowledge*. Recent research continues to point to the important role of activated prior knowledge as a prerequisite to learning. Learning requires the integration of new lesson content with prior knowledge already stored in long-term memory: This integration process occurs in working memory, which is where learning happens. Therefore, relevant prior knowledge must be activated or retrieved from long-term memory to make it available in working memory. And it needs to be in working memory before the meat of the lesson is delivered.

Using conventions is a very powerful way for designers to tap into their learners’ prior knowledge, to provide shortcuts to making meaning, which will help keep them paying attention. Kostelnick (2003) found, “Conventional grip serves readers in a variety of ways, chiefly by forming well-worn paths that they can amble along with minimal cognitive and rhetorical stress. Interpretation would be extremely demanding, indeed, exhausting, if we had to deal constantly with design novelty.” Examples of conventions used in the wider scope of general document design, but which should also be considered in instructional graphic design where applicable include:

Structural conventions, which help viewers to organize information:

- Tabs and dividers
- Toolbars, palettes, and tear-off menus
- Matrices

Emphasis conventions, which tell the viewer what’s important:

- Large print
- Darker areas, spot color, arrows
- Location on page

Trust (Because conventions draw the reader down well-worn paths, their familiarity often creates credibility by simply meeting the readers’ expectations):
• Watermarks – enhance credibility
• Paper stocks – e.g. embossed, vellum
• Nameplates

Tone – enables viewers to interpret the designer’s attitude toward the subject:
• Centered and all caps create a formal and authoritative tone
• Gridlines and symbols project a technical and precise tone
• Freehand drawings are more casual

Using such conventions in instructional graphics can help hold the viewers’ attention because they are comfortable with the familiar. “We direct our attention mainly to those messages we know we will like; they suit our tastes, confirm our prejudice, or excite our indignation in ways which appeal to our self-esteem. Selection does not end there, however; when we are presented with a complex message, we are likely to notice particularly those parts of it which confirm our previous attitudes” (Morgan & Welton, 1992).

“Visual communication requires a two-way path between the producer and receiver of the message. Consequently, the focus of this work has more to do with remembering than seeing. If you learn to analyze visual messages in terms of your personal reaction, their historical context, how they are made, the moral responsibilities of the producer, and their impact on society, you will be able to create and use memorable pictures. More often than not, images that are remembered are the ones that combined aesthetically pleasing design elements with content that matters” (Lester, 2000).

Summary

Graphic design (presenting information using text and graphics) and instructional graphic design (iconic expressions of content that are designed to optimize learning and performance) have several overlapping fundamentals; of these, contrast - of size, shape, and color - is the most important for instructional graphic designers to incorporate.
The instructional graphic designer strives to gain and hold the viewer’s attention, for without these occurring the message is lost before it has ever been conveyed. Contrast of size, shape, and color helps command learners’ attention. Including content and graphic elements that matter to learners – those which tickle memory or are comfortably familiar – helps keep learners’ attention.

In Figure 3, you’ll see a graphic that has been used for years in new system user training:

![Figure 3](image3.png)

About a year ago, I revised it by adding color and subtle highlights to the important values (See Figure 4). During the class, I explain to learners that the boxes with dotted highlights are the values they need to really remember, and of those, the “fund” value is the most important. – it’s the “bucket” of money that supports a specific type of activity.

![Figure 4](image4.png)

After writing this paper and learning about the importance of contrast and activating prior knowledge in instructional graphics, I used contrast to revise the graphic by increasing the size of the important values as compared to the not-so-important values, and I added color
contrast - a red circle around the most important value – “fund”, and shaped it like a bucket, to activate learners’ prior knowledge (See Figure 5).

![Figure 5](image)

While aesthetically I prefer Figure 4, there is no doubt that, if you compare the two graphics, Figure 5 makes the message obvious while Figure 4 is merely a more colorful version of Figure 3.

In conclusion, it is clear that, rather than concentrate just on imparting information in a visually pleasing graphic, instructional graphic designers should use the principals of contrasting size, color, and shape, and should try to activate learners’ prior knowledge to make the graphic instantly more powerful – and to help learners learn better and faster.
References


